PATENT SPECIFICATION 767,567

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COMPLETE SPECIFICATION.

Improvements relating to Chains, Particularly Conveyor Chains.

We, ROWNSON, DREW AND CLYDESDALE, LIMITED, a British Company, of Maiden Lane, York Way, London, N.7, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to chains, and particularly to conveyor chains which are driven by chain sprockets and used to convey loads supported upon the links of the top flight of the chain. Hereinafter, chains made in accordance with the invention will be referred to as " conveyor chains " or as " chains " according to the context.

One object of the invention is to provide a flexible or bi-planar conveyor chain which reduces sliding friction to a minimum and eliminates costly maintenance which previously was a constant source of expense and inconvenience.

A further object is to provide a conveyor chain in which the links can be easily connected and disconnected and replacements of the links can be carried out rapidly without the use of special tools.

According to this invention, the flexible or bi-planar chain comprises a number of links and coupling pins for connecting the links, each link comprising a shank at one end which is integral with a forked part and adjacent links being connected by a coupling pin which is detachably arranged in seatings formed in the fork limbs of one link and is engaged with a part of the shank end of the other link when the two links are connected, the arrangement being such that the two links can be coupled and uncoupled merely by the insertion of the coupling pin into, and its removal, from the seatings. As viewed in plan each link somewhat resembles a tuning-fork or letter Y.

In one construction the link comprises an upper and a lower part which are interconnected at the end of the shank by a strut while the ends of each fork limb remote from the strut are interconnected. The seatings for the coupling pin are formed partly in laterally-projecting lugs formed on the outer faces of the fork limbs and partly in the interconnected ends of the upper and lower parts of the limbs.

The coupling pin is formed with a recess, in which the strut of the adjacent link is engaged, and with a lug which engages in the space between the upper and lower parts of the shank.

In this construction, the links provide a wide flat bearing surface adapted to carry boxes, crates, bottles and the like without damage and a wide flat bottom surface which provides an excellent wearing surface.

In the case of conveyor chains it is preferred to make the links of malleable cast iron and the coupling pins of forged steel.

One constructional form of the invention, as applied to a conveyor chain, is shown by way of example, in the accompanying drawings wherein :—

Figure 1 is an exploded view of the link and coupling pin combination, the Figure also including a fragmentary view of the shank part of the link ;

Figure 2 is a plan view, partly in section, of a number of links connected by the coupling pins ;

Figure 3 is a fragmentary elevation, partly in section, of a driving sprocket for the conveyor chain ;

Figure 4 is a section on the line C—C in Figure 3 ;

Figure 5 is a fragmentary view of a con-

[*Pri*

[*v*]

veyor chain which is carried on a support stand and is shown supporting a container ;

Figure 6 is a vertical section on the line D—D in Figure 5 ; and

Figure 7 is a diagrammatic sectional view taken at a bend in a conveyor system comprising two transversely-spaced conveyor chains and idler wheels which engage the inner sides of the chain links as the chains negotiate the bends.

Referring first to Figures 1 and 2 :

In this constructional form of the invention, which is applied to a conveyor chain, each of the chain links, which may be made of malleable cast iron, is fork-shaped as viewed in plan. Each link comprises two shank parts 1 and 2 at one end (hereinafter called the " rear end ") which are integral respectively with the upper limbs 3 and 4 and the lower limbs 5 and 6 of the fork. The front ends of the two parts of the two fork limbs are connected while the rear ends of the two parts of the shank are connected by a strut 7 of circular cross-section. The top surface of the link is smooth and flat to provide a wide bearing surface and the bottom surface is also flat and smooth to provide a wide wearing surface.

On the outer surface of the interconnected front ends of the upper and lower parts of each limb of the fork there is a laterally-projecting lug 8, the top surface 9 of which is flat and is spaced below the flat top surface of the upper part of the limb. As will appear hereinafter, the flat top surfaces 9 are provided to give a convenient means for holding down the chain links on curved tracks or wherever the tension of the chain is such that it tends to move out of its guides. The lugs 8 extend rearwardly for a short distance along the lower parts 5 and 6 of the fork limbs, towards the shank part 2 and the front end of each lug below the top surface 9 is curved.

Below the top surface 9 of each lug, the rear surface of the lug is shaped to form part of a curved transverse seating 10 for a coupling pin (referred to hereinafter) this seating also extending across the part interconnecting the front ends of the upper and lower parts of the fork limbs. The radius of curvature of the seating may be slightly greater than that of the coupling pin.

The upper parts of the shank and fork limbs may be thicker than the lower parts and, in this case, the upper part may be formed with a recess which extends upwards from the bottom face of the upper part from a position approximately above the centre of the curved coupling pin seating to a position in the shank short of the said strut.

The adjacent links are connected by forged steel coupling pins 11, each of which comprises a cross-piece 12, which is of circular cross section, and a central lug 13 which, when the pin is in position in the link, extends forwardly away from the strut 7. Opposite to the lug the cross-piece is formed with curved recess 14, the radius of which may be slightly greater than that of the strut 7.

In order to connect one link A to an adjacent link B, the end of the shank 1, 2 of the link A is arranged in the space between the fork limbs of the link B. The coupling pin 11 is passed through the fork limbs of the link B and engaged in the pin seatings 10, the strut 7 on the link A being engaged in the recess 14 in the cross-piece 12 of the pin.

Thus, merely by removing or adding coupling pins and links, it is a matter of simplicity to vary the length of the chain.

The conveyor chain may be driven by one or more driven chain sprockets and, in one method of driving, as shown in Figs. 3 and 4, the, or each, driving sprocket 15 is provided with two transversely-spaced, peripheral flanges 16 and 17 which are formed respectively with circumferentially-spaced teeth 16A and 17A. The teeth are adapted to engage behind the above mentioned laterally-projecting lugs 8 on the outer faces of the chain links. The conveyor may also be arranged to pass around one or more idler wheels which are smooth and are not provided with teeth.

Referring to Figures 5 and 6, a container 18 is shown supported upon the top flight of a straight run of a chain conveyor 19 which is built up of a number of chain links and link coupling pins as described above with reference to Figures 1 and 2. The chain is guided between the flanges of a channel section guide 20 and the sides of the container are guided between the upstanding parallel flanges 21 and 22 of the two transversely-spaced angle guide members 23 and 24 arranged on an elevated support stand which also supports two angle supports 25 and 26, the flat top faces of the links projecting slightly above the outwardly-directed horizontal flanges 27 and 28 of the angle supports.

When the conveyor chain is negotiating a bend in a horizontal plane the inner side of each link is engaged by the rim or flange of a smooth idler wheel, while the top surface of the lug on the outer side of the link is preferably engaged by a holding-down plate. The, or each, idler wheel takes the pressure of the chain on the bend in a horizontal plane and reduces friction and wear to a minimum and without skidding. Thus, Figure 7 shows diagrammatically a conveyor system comprising two transversely-spaced chains 29 and 30 both of which are negotiating a bend, each chain being made of chain links and link coupling pins as described above with reference to Figures 1 and 2. On the bend the inner side of each link in the top flight of the chain conveyor is engaged by the

inclined smooth rim 31 of an inclined idler wheel 32 and the top surface 9 of the outer lug S is engaged by a holding-down plate 33. The inner side of each link in the return flight of the chain 29 is engaged by the smooth inclined rim 34 of an idler wheel 35 which rotates about a vertical axis. The inner side of each of the links in the top flight of the chain 30 is engaged by the smooth inclined rim 36 of an idler wheel 37 which is rotatable upon a vertical axis and the top surface 9 of the outer lug S is engaged by a holding-plate 38. The inner side of each of the links in the return flight of the chain 30 is engaged by the smooth inclined rim 39 of an idler wheel 40 which is rotatable about a vertical axis.

It will be appreciated that the chain links could be made of material other than malleable cast iron, such as manganese steel, phosphor bronze, cast iron or a plastic material.

One considerable advantage of a flexible or bi-planar conveyor chain made in accordance with this invention is that it is so designed that it enables corner discs or idler wheels to be fitted to reduce friction on bends in the conveyor track.

What we claim is :—

1. A bi-planar chain, comprising a number of links and coupling pins for connecting the links, each link comprising a shank at one end which is integral with a forked part and adjacent links being connected by a coupling pin which is detachably arranged in seatings formed in the fork limbs of one link and is engaged with a part of the shank end of the other link when the two links are connected, the arrangement being such that the two links can be coupled and uncoupled merely by the insertion of the coupling pin into, and its removal, from the seatings.

2. A chain as claimed in Claim 1, wherein each link comprises an upper and a lower part which are interconnected at the end of the shank by a strut while the ends of each fork limb remote from the strut are interconnected.

3. A chain as claimed in Claim 2, wherein the seatings for the coupling pin are formed partly in laterally-projecting lugs formed on the outer faces of the fork limbs and partly in the interconnected ends of the upper and lower parts of the limbs.

4. A chain as claimed in Claim 3, wherein the coupling pin is formed with a recess, in which the strut of the adjacent link is engaged, and with a lug which engages in the space between the upper and lower parts of the shank.

5. A chain as claimed in any of the preceding claims, wherein each link is so shaped as to provide a wide flat bearing surface adapted to carry boxes, crates, bottles and the like without damage and a wide flat bottom surface which provides a wearing surface.

6. A chain as claimed in any of Claims 3 to 5, wherein the said laterally-projecting lugs are shaped to be engaged by transversely-spaced peripheral circumferentially-spaced teeth formed on a sprocket around which the chain is passed.

7. A chain conveyor system comprising a chain as claimed in any of the preceding Claims 1 to 6 which runs between guides, means being provided for engaging the top surfaces of lugs on the outer sides of the links so as to hold down the chain on curves or wherever the tension in the chain is such that it might tend to move upwards out of its guides.

8. A chain conveyor system as claimed in Claim 7, wherein the inner sides of the links which are negotiating a bend in the run of the conveyor chain are engaged by the smooth rim or flange of a freely rotating idler wheel.

9. A chain conveyor system as claimed in Claim 8, wherein the top surfaces of the lugs on the outer sides of the links which are negotiating the bend are engaged by a holding-down plate.

10. A chain conveyor system as claimed in Claims 7, 8 or 9, wherein the chain is driven by the engagement of teeth on a driven sprocket which engage with the lugs on the links.

11. A chain comprising links and coupling pins substantially as described with reference to Figures 1 and 2 of the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements relating to Chains, Particularly Conveyor Chains.

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This invention relates to chains, and particularly to conveyor chains which are driven by chain sprockets and used to convey loads supported upon the links of the top flight of the chain.

One object of the invention is to provide a flexible conveyor chain which reduces friction on a transverse plane to a minimum and eliminates costly maintenance which previously was a constant source of expense and inconvenience.

A further object is to provide a conveyor chain in which the links can be easily connected and disconnected and replacements of the links carried out rapidly without the use of special tools.

According to this invention, the chain is characterised by the feature that each link comprises a shank at one end which is integral with a forked part and that adjacent links are connected by a coupling pin which is detachably arranged in seatings formed in the fork limbs of one link and is engaged with a part of the shank end of the other link when the two links are connected, the arrangement being such that the two links can be coupled and uncoupled merely by the insertion of the coupling pin into and its removal from the seatings. As viewed in plan each link somewhat resembles a tuning-fork or letter Y.

In one construction the link as a whole comprises an upper and a lower part which are interconnected at the free end of the shank by a strut while the ends of each fork limb remote from the strut are interconnected. The seatings for the coupling pin are formed partly in laterally-projecting lugs formed on the outer faces of the fork limbs and partly in the interconnected ends of the upper and lower parts of the limbs.

The coupling pin is formed with a recess, in which the strut of the adjacent link is engaged, and with a lug which engages in the space between the upper and lower parts of the shank.

In this construction, the links provide a wide flat bearing surface adapted to carry boxes, crates, bottles and the like without damage and a wide flat bottom surface which provides an excellent wearing surface.

In the case of conveyor chains it is preferred to make the links of malleable cast iron and the coupling pins of forged steel.

In one constructional form of the invention, which is applied to a conveyor chain, each of the chain links is made of malleable cast iron and is fork-shaped as viewed in plan. Each link comprises a shank at one end (hereinafter called the "rear end") which is integral with the transversely spaced limbs of the fork at its front end. As viewed from the side, the link comprises a lower part and an upper part spaced above the lower part, the front ends of the two parts of the fork limbs being connected while the rear ends of the two parts of the shank are connected by a strut of circular cross-section. The top surface of the link is smooth and flat to provide a wide bearing surface and the bottom surface is also flat and smooth to provide a wide wearing surface.

On the outer surface of the interconnected front ends of the upper and lower parts of each limb there is a laterally-projecting lug, the top surface of which is flat and is spaced below the flat top surface of the upper part of the limb. The lug extends rearwardly for a short distance along the lower part of the limb towards the said shank and the front end of the lug below the top surface is curved to correspond with the curvature of the front end of the link connecting the upper and lower parts of the limb.

Below the top surface of the lug, the rear surface of the lug is shaped to form part of a curved transverse seating for the coupling pin, this seating also extending across the part interconnecting the front ends of the upper and lower parts of the limb. The radius of curvature is slightly greater than that of the coupling pin.

The upper parts of the shank and fork limbs may be thicker than the lower parts and, in this case, the upper part may be formed with a lightening recess which extends upwards from the bottom face of the upper part from a position approximately above the centre of the curved coupling pin seating to a position in the shank short of the said strut.

The adjacent links are connected by forged steel coupling pins, each of which comprises a cross-piece, which is of circular cross section, and a central lug which, when the pin is in position in the link, extends forwardly away from the strut. Opposite to the lug the cross-piece is formed with a curved recess, the radius of which is slightly greater than that of the said strut.

In order to connect one link A to an adjacent link B, the end of the shank of the link A is arranged in the space between the fork limbs of the link B. The coupling pin is passed through the fork limbs of the link B and engaged in the pin seatings, the strut on the link A being engaged in the recess in the cross-piece of the pin.

Thus, merely by removing or adding coupling pins and links, it is a matter of simplicity to vary the length of the chain.

The conveyor chain may be driven by one or more driven chain sprockets and, in one method of driving, the, or each, driving sprocket is provided with two transversely-spaced, peripheral flanges each of which is formed with a number of circumferentially-spaced teeth. The teeth are adapted to engage behind the above mentioned laterally-projecting lugs on the outer faces of the links. The conveyor may also be arranged to pass around one or more idler wheels which are smooth and are not provided with teeth.

When the chain is negotiating a bend in a horizontal plane the inner side of each link is engaged on and above the lug by the flange

of a smooth idler wheel while the outer side of the link above the other lug is engaged by a curved rail. The, or each, idler wheel takes the pressure of the chain on a bend in a horizontal plane and reduces friction and wear to a minimum and without skidding.

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Fig.1.

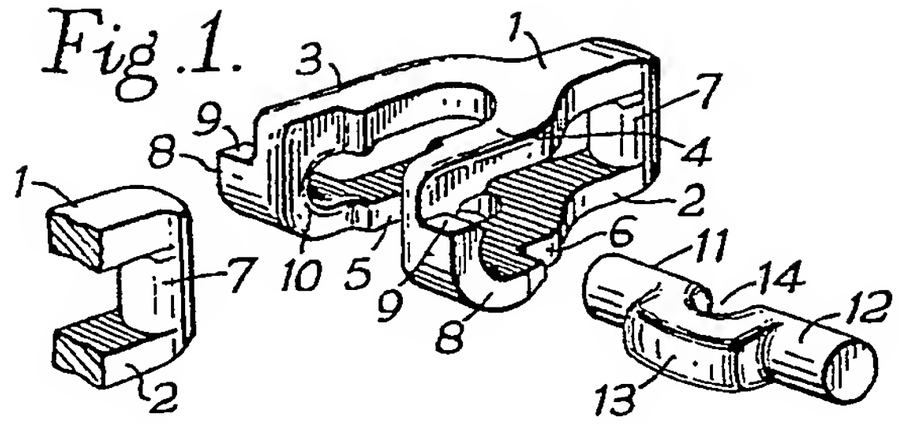
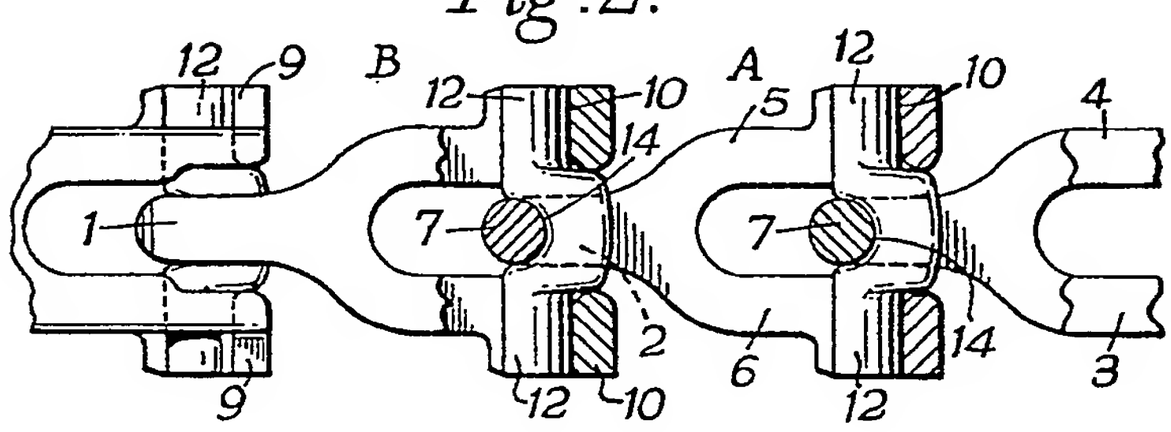


Fig.2.



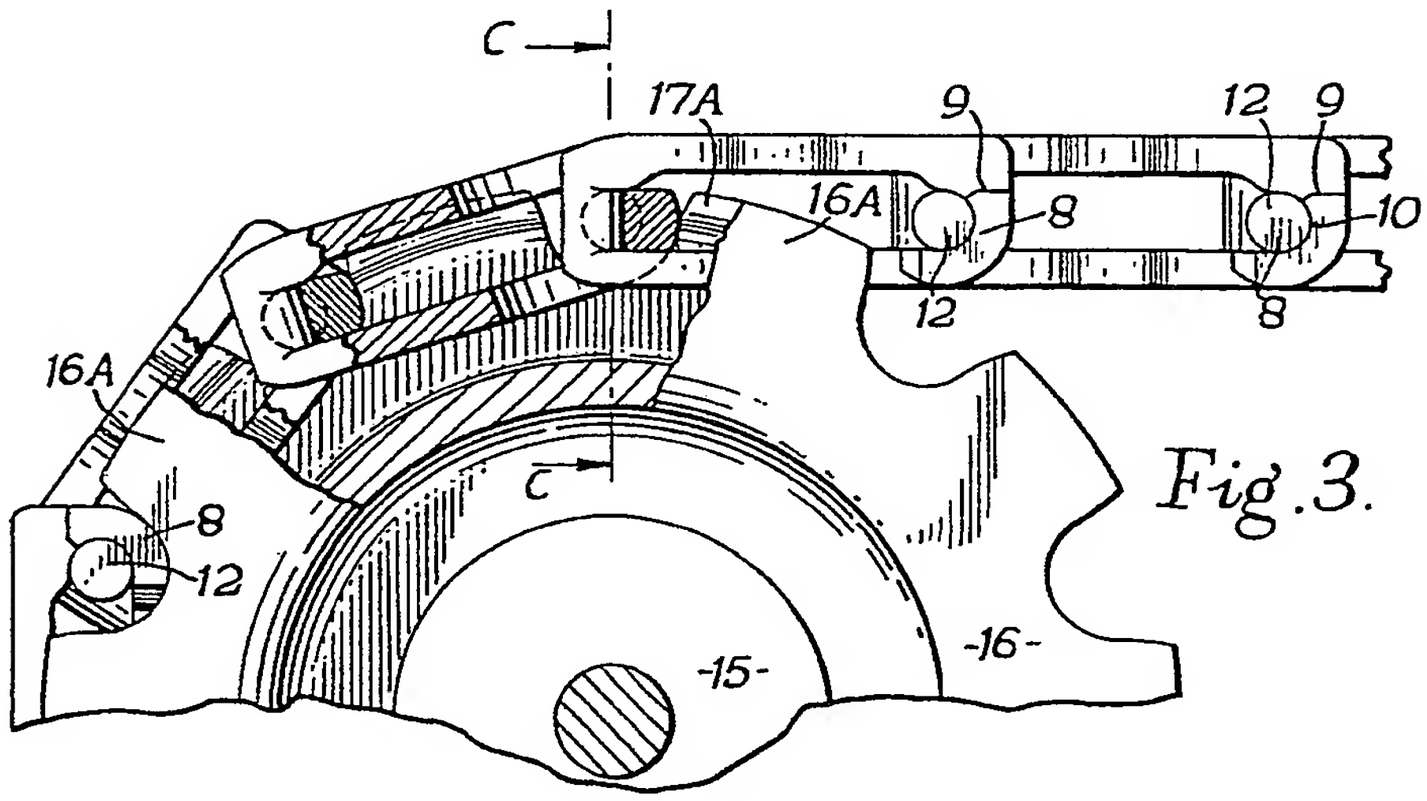
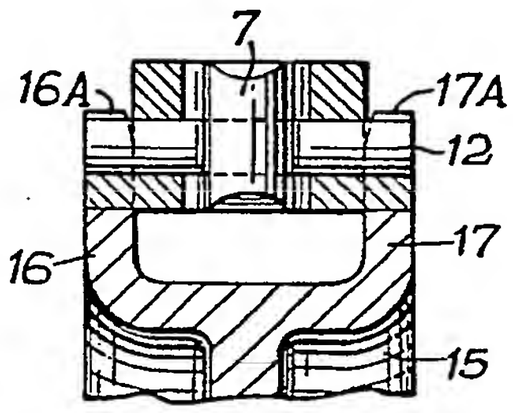


Fig.3.

Fig.4.



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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheets 1 & 2

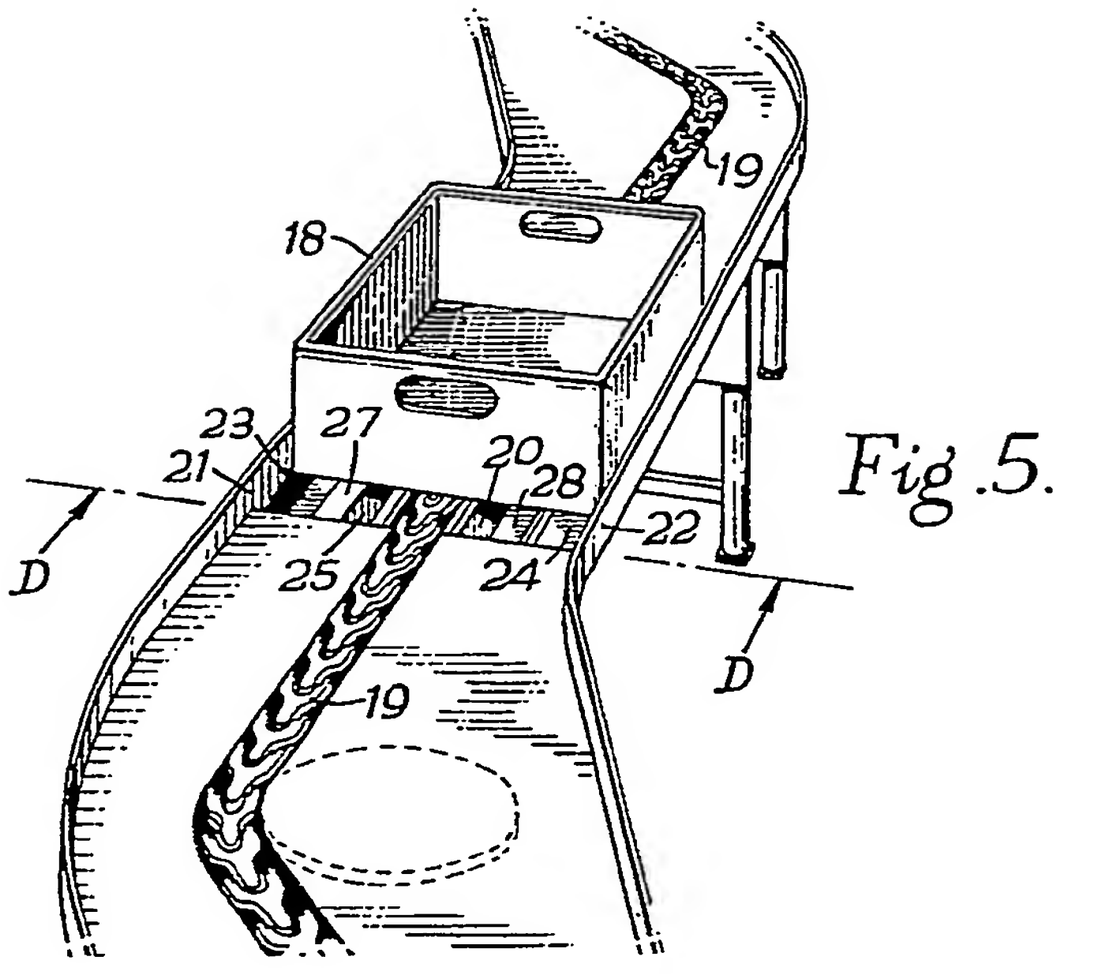
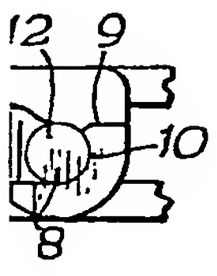
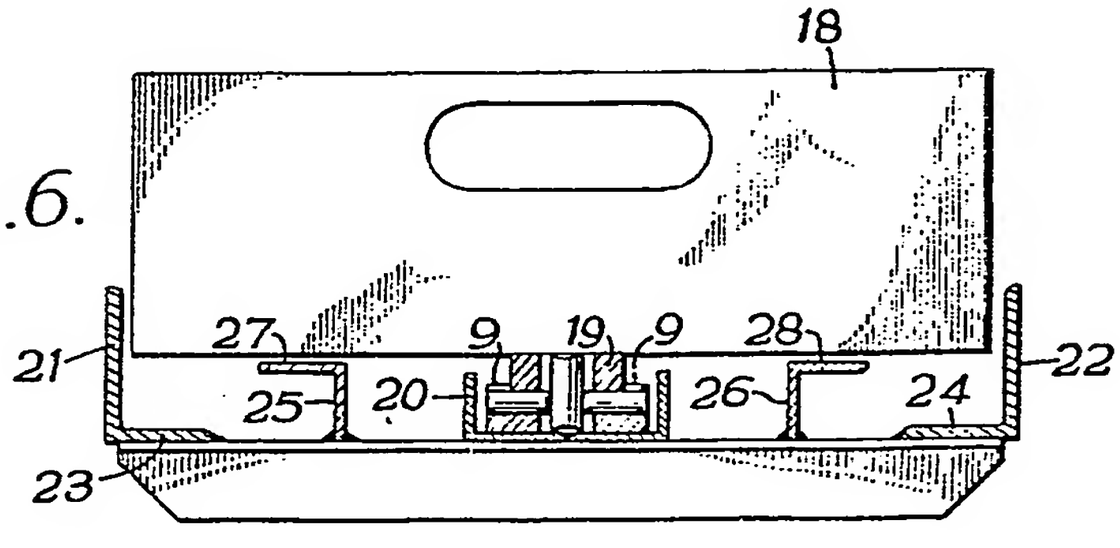


Fig .5.



g .3.

Fig .6.



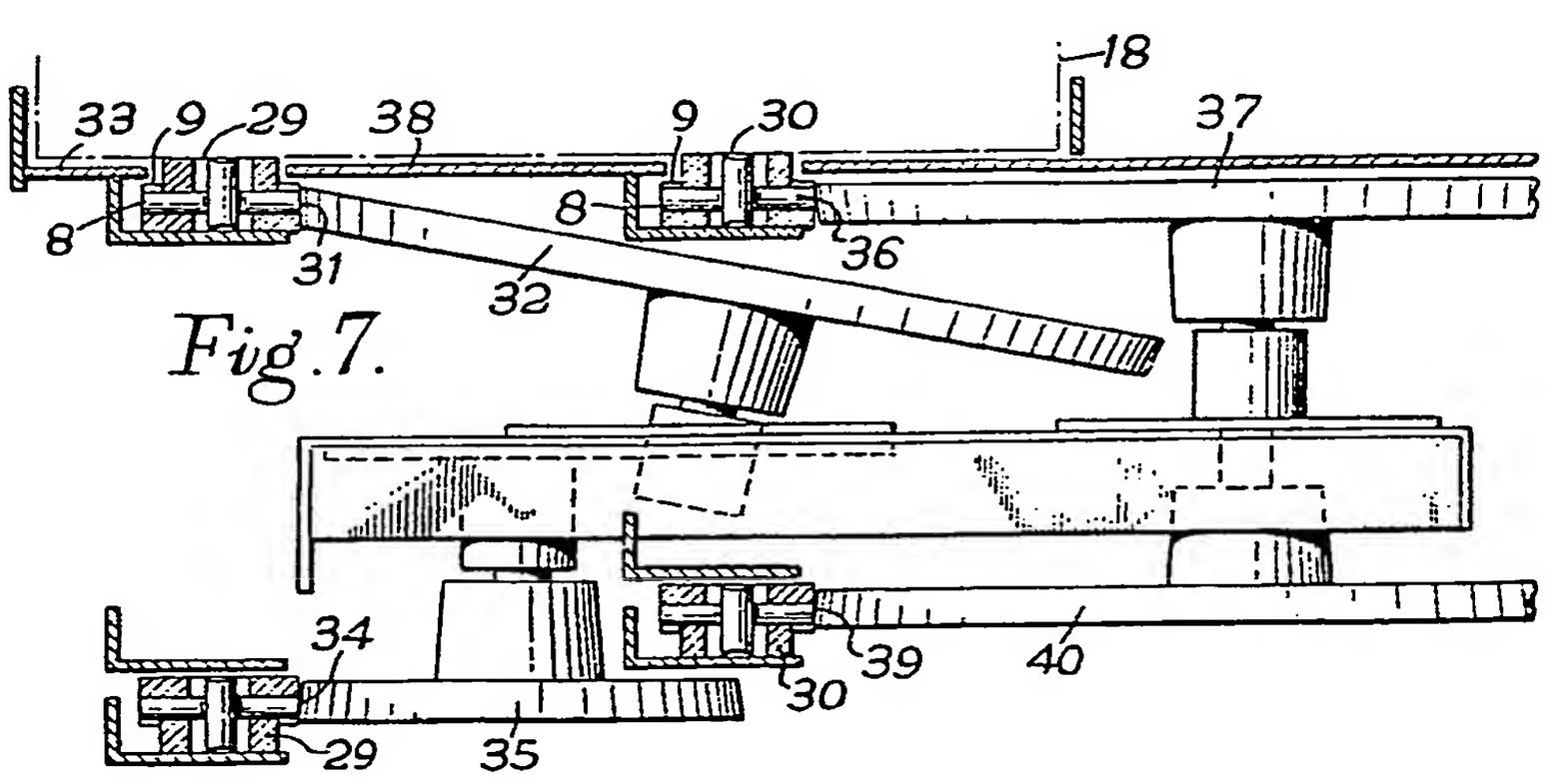


Fig .7.

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2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 1 & 2

Fig.1.

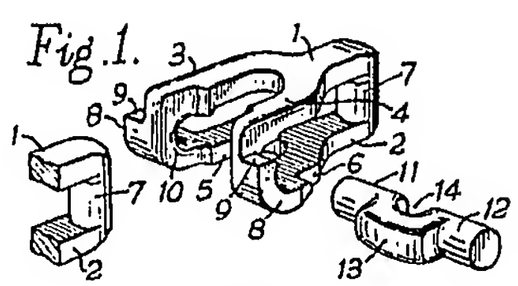
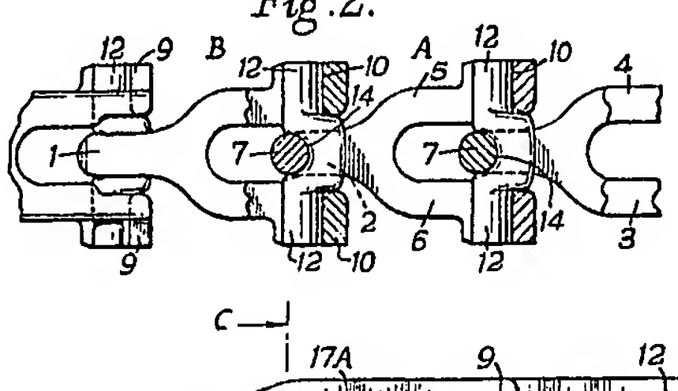


Fig.2.



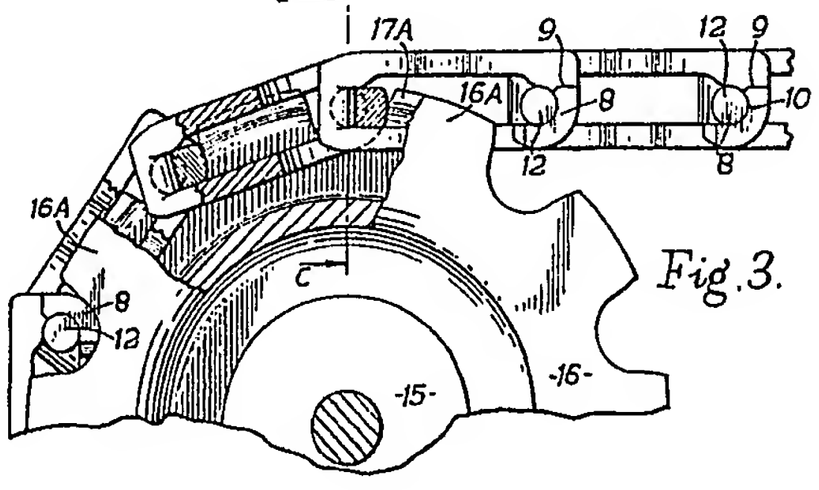


Fig.3.

Fig.4.

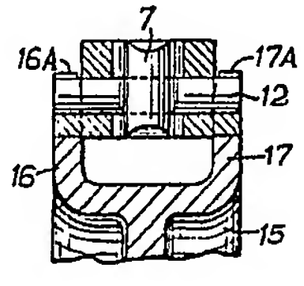


Fig.5.

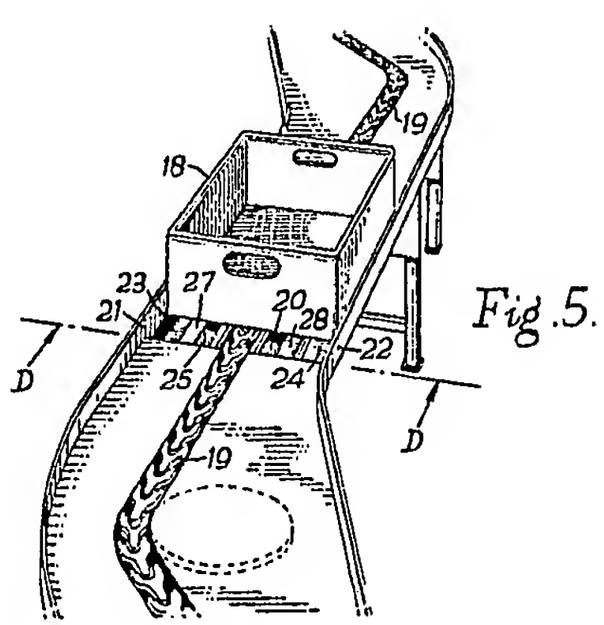


Fig.6.

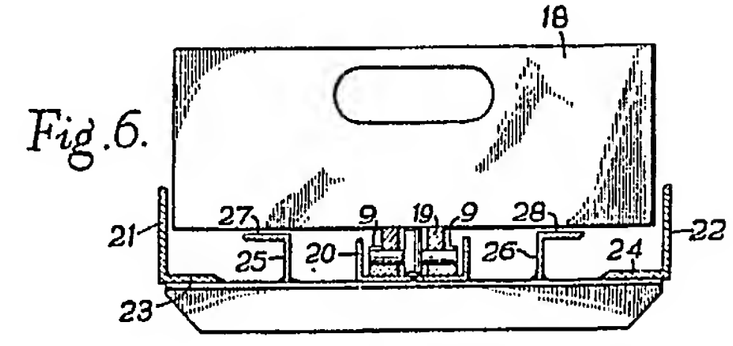


Fig.7.